

## REMARKS

Claims 5, 7 and 8 are pending in this application.

### **I. Claim Rejection Under 35 U.S.C. § 103**

The Examiner rejects claims 5, 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Parson et al. (US 6,440,359) ("US'359") in view of Ohyama et al. (US 6,355,090) (US'090"). Applicants respectfully traverse the rejection.

Claim 5 recites an aluminum alloy that contains 0.35-0.5 wt% Mg, 0.35-0.6 wt% Si and 0.03-0.06 wt% Mn, and AlMnFeSi dispersoid particles which are formed during homogenisation and which act as nucleation sites for Mg<sub>2</sub>Si particles during cooling after homogenisation.

A small amount of Mn is commonly applied to an alloy to promote the transformation of  $\beta$ -AlFeSi to  $\alpha$ -AlFeSi during homogenisation. However, Applicants have found that the addition of an excess amount of Mn of what is commonly used to transform  $\beta$ -AlFeSi to  $\alpha$ -AlFeSi has an additional beneficial effect on extrudability. The effect is, as previously stated, related to the formation of Mn-dispersoids, which serve as nucleation sites for Mg<sub>2</sub>Si during cooling after homogenisation.

This "drains" Mg and Si from the zones near the grain boundaries and leads to the reduction of large Mg<sub>2</sub>Si particles in the grain boundaries (large Mg<sub>2</sub>Si particles are detrimental to extrudability).

US'359 discloses that it is necessary to add a small amount of Mn in order to promote the transformation of  $\beta$ -AlFeSi to  $\alpha$ -AlFeSi during homogenisation when the Si content is above 0.50 wt%, because  $\beta$ -AlFeSi is detrimental to the surface finish after extrusion (see col. 3, lines 17-39).

However, in the present invention, the beneficial effect of Mn is achieved when the amount of Mn is **higher** than what is necessary for the transformation of  $\beta$ -AlFeSi to  $\alpha$ -AlFeSi. **The higher Mn content reduces the number of coarse Mg<sub>2</sub>Si particles in the billets after homogenisation**, and this is not disclosed or suggested in US'359. The effect of the claimed alloy, and in particular the effect of the addition of Mn in the alloy (0.03-0.06 wt%), is not disclosed or suggested in the reference. This indicates that one of ordinary skill in the art would not have had any reasonable expectation of success of attaining the advantages of the claimed

alloy having an Mn content of 0.03-0.06 wt%, in combination with a heat treatment, to obtain an alloy that includes “AlMnFeSi dispersoid particles which are formed during homogenisation and which act as nucleation sites for Mg<sub>2</sub>Si particles during cooling after homogenisation”, as recited in claim 5.

Moreover, as acknowledged by the Examiner, US’359 does not teach a content of Mg of 0.35-0.5 wt%, as recited in claim 5 (see Office Action, page 4, 1<sup>st</sup> full paragraph and the table in col. 2 of the reference). The low Mg content, as taught by the reference, reduces the strength of the alloy, and makes it unstable and less consistent in terms of strength quality. **In addition, the low Mg content impacts the formation of the AlMnFeSi dispersoid particles.**

*A prima facie* case of obviousness may be rebutted by showing that the art, in any material respect, teaches away from the claimed invention (see MPEP 2144.05 III). US’359 clearly teaches away from an Mg content above 0.34 wt%. The reference states, “The Mg content of the invention alloy is **set at 0.20-0.34 preferably 0.20-0.30%**. If the Mg content is too low, it is difficult to achieve the required strength in the aged extrusions. **Extrusion pressure increases with Mg content, and becomes unacceptable at high Mg contents**” (see col. 2, lines 59-63, emphasis added). Accordingly, the reference clearly teaches away from an Mg content above 0.34 wt%.

The Examiner asserts that “US’359 teaches the intermetallics including Al(Fe,Mn)Si...which reads on the AlMnFeSi dispersoid particles as recited in the instant claim” (see Office Action, page 5, lines 8-10). However, this is not correct, because the reference does not disclose or suggest that AlMnFeSi dispersoid particles are **formed during homogenisation**, as in the alloy of claim 5.

The Examiner cites US’090 for teaching an Mg content of 0.2-5 wt%, and asserts that it would have been obvious to add a proper amount of Mg, as taught by US’090, in the alloy of US’359, in order to enhance the strength of the aluminum alloy. However, one of ordinary skill in the art would not have had any reason to increase the amount of Mg, because US’359 clearly teaches away from exceeding 0.34wt% of Mg.

Moreover, US'090 discloses an aluminum alloy for **wrought material**, where the alloy contains wide ranges of Mg and Si (up to 5% Mg). The upper limit of Mg disclosed in this reference is far above the amount included in the alloy of claim 5 (0.35-0.5 wt%), and if this large amount of Mg were included in the alloy of claim 5, then it would have detrimental effects when used for extrusion purposes, as taught by US'359. In fact, this large amount of Mg simply cannot be used for such purposes.

Furthermore, the alloy of US'090 contains 2.5-4.0 wt% of Si, which is much more Si than in the alloy of claim 5 (0.35-0.6 wt%), and the alloy of US'090 contains 0.01-1.2 wt% of Mn, which much more Mn than in the alloy of claim 5 (0.03-0.06 wt%). Moreover, the reference fails to disclose or suggest the importance of controlling the Mn level within a narrow range (i.e., 0.03-0.06 wt%) in order to obtain an alloy including "AlMnFeSi dispersoid particles which are formed during homogenisation and which act as nucleation sites for Mg<sub>2</sub>Si particles during cooling after homogenisation", as recited in claim 5. On the contrary, the alloy according to US'090 includes a much higher Mn content than 0.03-0.06 wt%. The high Mn content (above 0.06 wt%) makes the alloy quench sensitive, as described on pages 6-7 of the specification.

Accordingly, US'090 discloses an alloy that is completely different from the alloy of claim 5, and one of ordinary skill in the art would not have been motivated to combine US'090 with US'359 to arrive at the presently claimed invention.

In view of the foregoing, the aluminum alloy of claim 5 would not have been obvious over the references.

Claims 7 and 8 depend directly from claim 5, and thus also would not have been obvious over the references.

Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

## II. Conclusion

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied references.

Therefore, in view of the foregoing remarks, it is submitted that the rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

Oddvin REISO et al.

/Andrew B.  
Freistein/

By

Andrew B. Freistein  
Registration No. 52,917  
Attorney for Applicants

ABF/emj  
Washington, D.C. 20005-1503  
Telephone (202) 721-8200  
Facsimile (202) 721-8250  
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Digitally signed by /Andrew B. Freistein/  
DN: cn=/Andrew B. Freistein, o=H&L,  
ou=H&L, email=afreistein@weissbroth,  
com,c=US  
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